

THE VEGETATION AND ECOLOGY OF COASTAL  
BELT OF ~~East Pakistan~~

~~East Pakistan~~

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INTRODUCTION

Bangla Desh

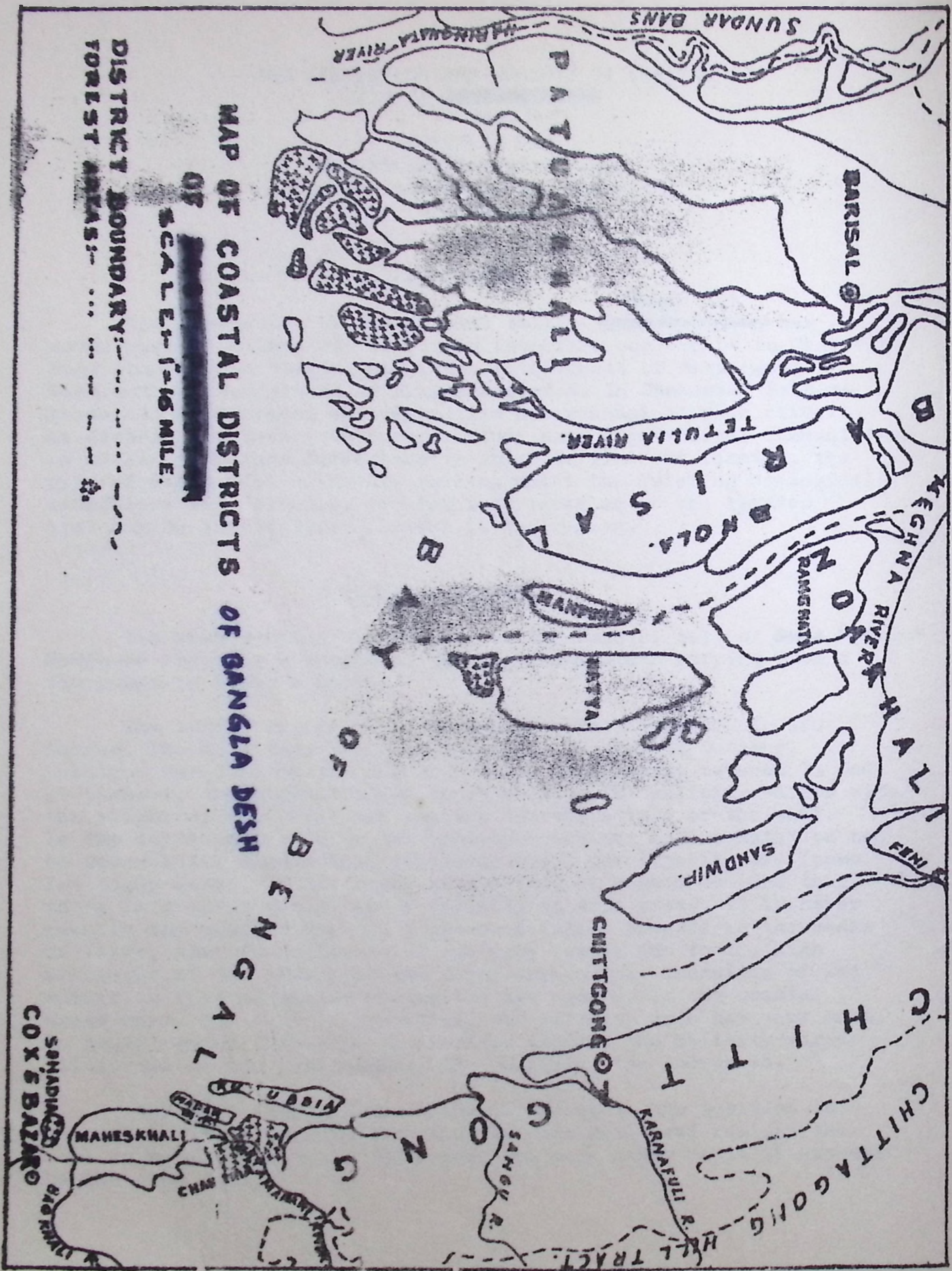
The vegetation of the coastal belt of ~~East Pakistan~~ has never reached climax due to biotic interferences except in Chakaria Sundarbans of Chittagong District, Patherghata of Bakherganj District and Sundarbans of Khulna District. In Chakaria, Patherghata and Sundarbans, the vegetation has reached edaphic climax. An attempt has been made here to study some vegetational communities in areas other than Sundarbans in order to find out firstly, the type of vegetation naturally growing under the existing ecological conditions and secondly, to draw inferences as to the species that may be successfully planted in the region.

ECOLOGICAL FACTORS

The area studied covers part of the coastal belt of ~~East Pakistan~~ <sup>Bangla Desh</sup> covering a length of 550 miles and width varying from a few yards to about a mile.

The annual rainfall in the region varies from 100 to 160 inches. The main rain comes in Summer, i.e., May to October. Relative humidity in the region remains high mostly between 73 and 90 percent, the highest being in June-July. The salinity varies with the height of the land from the sea and the nature of the soil. In the dry season, due to the capillary action, salt crustation can be seen on the higher land specially where the deposits are loams and sandy loams. In the rainy season this is washed out and thus there is a large variation of salinity in such areas. It is never seen in the sandy banks. On lands more inland located in the banks of river, similar variation of salinity occurs due to the high discharge of the rivers in the rainy season and incursions of sea waters to long distances during the dry season. In the coastal areas where the tide is operative, the salinity does not vary much. In newly formed banks, in the earlier stages, the salinity varies little and as the land rises, the salinity also increases.

The soil composition varies according to the position in respect to the rivers and the sea. In more sheltered regions the soil is mostly clayey and gets more and more sandy as it is exposed to the open sea.



MAP OF COASTAL DISTRICTS OF BENGAL DESH  
 OF ~~INDIA~~  
 SCALE: 1" = 16 MILE.

DISTRICT BOUNDARY: - - - - -  
 FOREST AREAS: . . . . .

SANDWIP  
 COX'S BAZAR

Bangla Desh  
~~East Pakistan~~ is a very densely populated region. Its coastal areas are the most thickly populated and, therefore, the land hunger is very high. Arrangements for its cultivation start much earlier than the appearance of land above sea level. This is mainly done by the construction of embankments. The socio-economic factors acting on the land are in the most extreme form and not congenial for the growth of vegetation.

This paper mainly depends on the visual estimates during the touring in the region for the purposes of supervising the afforestation work and on the various sources of information.

#### VEGETATION OF THE REGION

The vegetation of the coastal region shows some special characteristics of Xerophytes as the soil becomes physiologically dry. Secondly, in the tidal saline waters, the most of the plants develop pneumatophores - a special breathing device and a special type of germination, the vivipary for continuation of its race. Two broad formations are recognised, viz.,

- (1) Beach vegetation.
- (2) Tidal vegetation or mangrove.

(1) Beach Vegetation: The coastal areas of Chittagong, Noakhali, Patuakhali and Barisal including off-shore islands where the habitat is an exposed one and the soil is sea sand (course, porous and dry) a special type of vegetation develops which is known as beach forest or beach vegetation or more precisely a facultative halphytic formations.

The major characteristic of this formation is the presence of Casuarina equisetifolia which are ever green and very light foliaged plants (1). Except in Cox's Bazar coast where ravages of grazing are less no other places it does occur. Scattered smaller evergreen trees also occur with small number of deciduous trees where complete absence of Casuarina has been noticed. Besides tree species, there are also many shrubs, herbs, grasses and creepers. Generally, the species are distributed on saline embankments, depressions on the shore and in the creeks. The species usually found are:-

- (i) Trees:- Casuarina equisetifolia (Jhau), Pongamia glabra (Kerong or Keranja), Albizia procera (Sil Koroi), Calophyllum inophyllum (Ponyal), Erythrina sp. (Mandar), Exoecaria agallocha (Gewa or Gua).

- (ii) Shrubs:- Hibiscus tiliaceus (Bhola or Bolai), Pandanus odoritissima (Kewa kata), Thespesia populnea (Dumbla), Vitex negunda (Nisinda), Trewia nudiflora (Pitali), Tamarix gallica (Nuna Jhau).
- (iii) Herbs:- Acanthus illicifolius (Hargaza), Croton Sparciflora (Croton), Ixera Sp. (Rangan), Cassia sophera (Kalkasundi).
- (iv) Grasses:- Oryza coarctata (Banidhan or Ura), Saccharum spontenum (Khagra), Phoenix sp. (Hantal or Khejur) Cynodon dactylon (Durba), and Imperata cylindricum (Uloo).
- (v) Creepers:- Ipomea biloba (Chagulkuri), Derris scandens (Noa-lata), Dalbergia spinosa (Amanta).

(2) Mangrove Vegetation:- The mangrove vegetation is ecological group of plants belonging to several unrelated families. But they possess similar physiological characteristics and structural adaptations inhabiting tidal lands in the tropics. These complex plant communities always occupy a belt of varying width along the tropical shores, always fringing muddy salt water creeks, lagoons and inlets and always scrupulously avoiding sandy beach and rocky shores exposed to the force of winds and waves. They form an entangled mass of small trees along the coast which are not easily penetrable. This vegetation is not found beyond the influence of salt water brought by daily tides (4).

This vegetation occurs in the entire coast of <sup>Bangla Desh</sup> ~~East Pakistan~~ starting from Teknaf to Sundarbans growing in the sheltered river estuaries and along the small creeks but avoiding sandy beaches and the places where the actions of wind and sea wave are severe. Except three compact areas namely, Chakaria, Sundarbans in Chittagong District, Patherghata range of Patuakhali District and a few hundred acres of Char Osman in Noakhali District, the vegetation with varying composition occurs sparsely along the coast and off-shore islands and in the estuaries of rivers and streams. The approximate composition of the coastal belt and off-shore island except Sundarbans is given in Table 1. ( 2,3,5,6 & 7 ).

#### ECOLOGICAL STATUS OF THE TRACT

The coastal successions start on a marine deposit or estuarine silt depositions such as mud, sand or coral either below or above high tide mark. As in other primary successions there is a progression from extreme conditions, which only a small number of specialised species can tolerate, to less extreme conditions suitable for a much greater number of species. In the earlier stages, the environmental factors, such as the effect of tides, wave action,

Table 1. Approximate occurrence and composition of mangroves in the coastal areas (Except Sundarbans).

Species	1	2	3	4	5	6	7	8
		Chittagong	Char	Barisal	Patuakhali	Scattered		
		along-shore	along coast	along coast	along coast	along coast	along coast	along coast
		21020 acres	700 acres	1000 acres	1000 acres	1000 acres	1000 acres	1000 acres
		island.	island.	island	island	island	island	island
<sup>a</sup> Heritiera littoralis(Sundri).	-	x	-	-	-	-	-	-
Heritiera fomes (Sundri).	x	x	-	-	-	-	-	-
Rhizophora mucronata.	x	x	-	-	-	-	-	-
" conjugata (Hawa).	x	x	-	-	-	-	-	-
Gerriops roxbughiana(Goran).	x	x	-	-	-	-	-	-
" tagal (hot Goran).	-	-	-	-	-	-	-	-
Avicenia officinalis(Kala bean).	x	x	-	-	-	-	-	-
" alba (Sada baen).	x	x	-	-	-	-	-	-
Carapa Obovata(Dhundal or karamkhala).	x	x	-	-	-	-	-	-
Carapa molucensis (Passur).	x	x	-	-	-	-	-	-
Gynometra ramiflora(Singra).	x	x	-	-	-	-	-	-
Lumnitzera apetala (Kirpa).	-	-	-	-	-	-	-	-
Sonneratia apetala (Keora).	x	x	-	-	-	-	-	-
" acida (Soila or Ora).	x	x	-	-	-	-	-	-

<sup>a</sup> A single tree has been found in Sandwip Island.

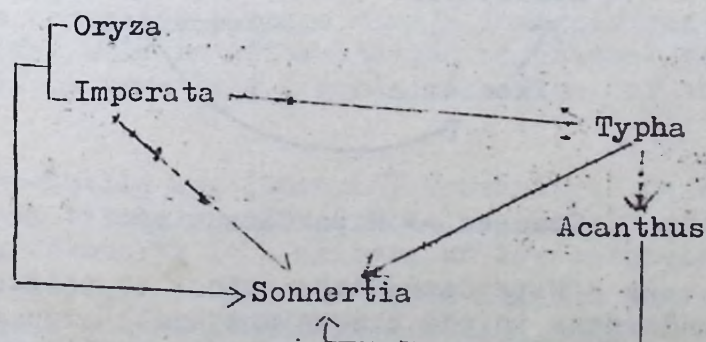
<sup>b</sup> x = present  
 - = absent

	1	2	3	4	5	6	7	8
<i>Excoecaria agallocha</i> (Gewa or Goa).		X	X	X	X	X	X	X
<i>Amoora cucullata</i> (Amoor).		X	-	-	-	-	-	-
<i>Hibiscus tiliaceus</i> (Bhola or bolai).		X	X	X	X	X	X	X
<i>Cebera odollam</i> (Dakur).		X	X	-	-	X	X	X
<i>Kandelia rheedii</i> (Goria).		X	X	-	-	-	X	-
<i>Bruguiera cylindrica</i> (Kakra).		-	-	-	-	-	X	-
" <i>Gymnorizha</i> (Kakra).		X	-	-	-	-	X	-
<i>Barringtonia racemosa</i> (Kumria).		-	-	-	-	-	X	-
<i>Ficus retusa</i> (Zir).		-	-	-	-	-	X	-
<i>Tamarix gallica</i> (Nuna Jhau).		X	X	X	X	X	X	X
<i>Aegicerus majus</i> (Khalshi or kasalong).		X	-	-	-	-	X	-
<i>Pandanus odoritissima</i> (Kewa kata).		X	X	X	X	X	X	X
<i>Acanthus illicifolius</i> (Hargaza kata).		X	X	X	X	X	X	X
<i>Dalbergia spinosa</i> (Amanta).		X	-	-	-	-	X	-
<i>Phoenix paludoza</i> (Hantal).		X	X	X	X	X	X	X
<i>Nipa fruticans</i> (Golpata).		X	X	-	-	-	X	X
<i>Typha elephantica</i> (Hogla).		X	X	X	X	X	X	X
<i>Aegialitis rotundifolia</i> (Munya).		X	-	-	-	-	X	-
<i>Imperata cylindricum</i> (Uloo).		X	X	X	X	X	X	X
<i>Oryza coarctata</i> (Uri or Banidhan).		X	X	X	X	X	X	X

Sea winds, cyclones and salt water, as well as the nature of the substratum, play a much larger part in determining the nature of the vegetation. During the course of succession, the importance of these non-climatic factors, becomes less and the vegetation gradually becomes similar to the climatic climax of the region (8). As regards our coastal belt and off-shore islands under review, the following communities of vegetation were noticed. The vegetation of these areas has never reached the climax except in Chakaria Sundarbans and in Patherghata (part of Sundarbans now in Barisal Coastal Division). At one or other stages, due to interference of biotic factors, the progress of succession had been stopped or retrogression started or secondary succession was given a start. The following vegetational communities were recognised.

1. Avicenia Community.
2. Grasses- Sonnertia Community.
3. Grasses-Nipa Community.
4. Grasses-Suaeda Community.
5. Cynodon sp.-Acanthus-Gewa Community.
6. Ipomea-Scilla Community.

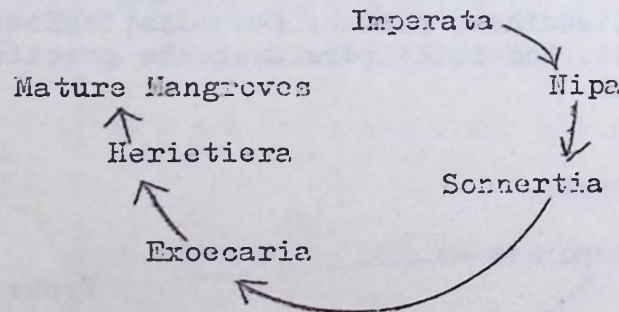
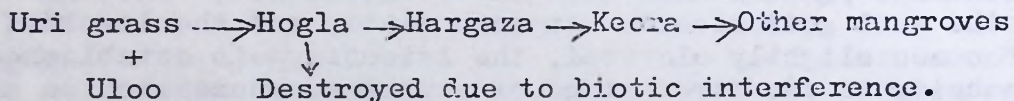
1. The Avicenia Community is on the newly formed muddy areas where it goes under water during the high tide and come up during the low tide. Avicenia is the pioneer species. Amongst the Avicenia species *A. alba* comes up abundantly in the areas facing the sea, whereas *A. officinalis* prefers land near river estuaries. As the time passes, the soil gets rich in organic matter and the level of the ground becomes slightly elevated, the Avicenia gets established. This community is the first stage of a primary succession on newly formed maritime muddy lands which is rich in organic matter. This community has been found on Sonadia Islands and estuarine islands, Maheskhal Island, in the northern part of Kutubdia, Tenfikatabdian and some parts of Patuakhali. Under the pure Avicenia practically no undergrowth exists.



Grasses — Sonnertia Community

2. The Grasses-- Sonnertia Community:- This has been noticed in the river estuaries where the water is brackish not saline. The grasses like Hugla (T. elephantica), Uri (Oryza coarctata), Uloo (Imperata cylindrica) come on the newly formed river estuaries. As in the previous one, when the level of the ground is raised higher, the Keora (Sonnertia Sp.) invades the area and gets established. This is the first stage of the primary succession for a climax vegetation.

This community is always found in all the river estuaries falling in the sea. For example, in Noakhali District, Urigrass is being followed by Hogla grass (Typha elephantica). It is then followed by keora (Sonnertia apetala). But in most of the places Uri-Hogla Community is completely destroyed by grazing and by conversion into agriculture. So the successional stage cannot reach beyond Uri-Hogla Community in most of the cases. But in quite a good number of places as in Char Osman, Keora has established. Trees of 25'-30' high has been observed in these localities. In Bhola of Barisal and Southern part of Patuakhali, Keora (Sonnertia apetala) along with soila (Sonnertia acida) comes up. The undergrowth in these places is also nil except grasses and in some places a few patches of Hargaza (Acanthus ilicifolius). Where biotic interference is less, it attains a climax type of vegetation which has been found in Chakaria Sundarbans in the estuary of Matamuhuri River.



Grasses → Nipa Community . .

3. The Grasses — Nipa Community:- This typical uloo-Nipa formation of Sundarbans in the creeks and small streams is localised in a small area of the southern part of Patuakhali where water is brackish due to the flow of large number of rivers. Gradually Keora comes into existance as the area becomes elevated by siltation in course of time. Ultimately, a climax type of vegetation similar to that of the Sundarbans is attained.



Imperata → Nipa fruticans → Sonnertia apetala  
 +  
 Sonnertia acida

→ Exoecaria agallocha → Herietiera → Mature Mangrove.

4. Urigrass and Suaeda Community:- This community perhaps is not the primary succession. It is probably the base for starting of a secondary succession. As studied, in this area the primary succession reached upto the Avicenia stage (as in the case of grasses-Avicenia Community) and after sometime when the vegetation was completely destroyed by the biotic interference or it continued for sometime. During this blank period, the grasses like Oryza Coarctata along with some halophytic plants (Suaeda nudiflora) have invaded the areas. This community is vividly pictured in Eastern Part of Kutubdia Islands, Western Part of Chakaria, Eastern Part of Sandwip Islands and the coastal areas of Banskhali of Chittagong District and some parts of Hatiya and Rangati of Noakhali District.

5. Cynodon—Acanthus—Gewa Community:- This community is perhaps the first stage in the secondary succession or a middle stage of primary succession whose earlier stages are missing as because this community has been noticed in the area of high charland where grazing and other biotic factors have completely destroyed the primary vegetation. It becomes muddy during rains but when the tide water reaches the area. During summer, the area becomes dry and the soil often gets cracked.

The first three communities as mentioned earlier are completely absent in these areas. Only Cynodon sp. occupies the whole area. After the Cynodon sp. has established, Acanthus comes. When the Acanthus forms scattered patches of shrubby growth, it can hold even small seeds brought during the high tide. As the area is suitable for Gewa (as studied in the field), it supports the invasion of Gewa only. This community perhaps though insignificant in evidence is playing a vital role in afforestation of coastal belt and offshore islands by providing a good indication for the choice of species.

6. Ipomea—Scilla sp. (Gorosun) Community:- On sandy shores patches of Ipomea biloba are found trailing on the ground along with Scilla sp. This community is a mixture of low herbacious plants. The other associates of Ipomea are Vitex negunda sp., Calotropis Procera, Bonnya sp., Heliotropium sp., Croton sparsiflora, etc. Behind this, Island vegetation or pure stand of Casuarina equisetifolia can be found.

The majority of these species are halophytes and are unharmed by the occasional inundation and high content of salt in the soil.

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